

Three Additional New Species of *Aristochroa* Tschitschérine (Coleoptera: Carabidae: Pterostichini) from the Gaoligongshan of Western Yunnan Province, China

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Three new species of the genus *Aristochroa* Tschitschérine are described from the Gaoligongshan of western Yunnan Province, China: *A. yuae* Kavanaugh and Liang, sp. nov. (type locality = 10.1 to 11.5 km west of Shibali, 3225 m, Fugong County); *A. exochopleurae* Kavanaugh and Liang, sp. nov. (type locality = Fengxue Yakou, 3290 m, Lushui County); and *A. splendida* Kavanaugh and Liang, sp. nov. (type locality = second cirque south of Shibali Yakou, 3780 m, Fugong County). Members of these new species are distinguished from each other and from all previously described *Aristochroa* species on the basis of features of pronotal and elytral shape and chaetotaxy, apical abdominal chaetotaxy, body color and development of microsculpture, and form of both male and female genitalia. Critical morphological features, habitat, and geographical distribution are illustrated for each species.

Aristochroa Tschitschérine, 1898, is one of the genera included in the carabid beetle tribe Pterostichini. To date, 26 species of this genus have been described from Yunnan, Sichuan, Xizang (Tibet), Qinghai, and Gansu Provinces in China (Tschitschérine 1898, 1903; Straneo 1938; Xie and Yu 1993; Sciaky and Wrase 1997; Zamotajlov and Fedorenko 2000; Liang and Yu 2002; Tian 2004), including one species from Gaoligongshan of western Yunnan (Kavanaugh and Liang, 2003). One additional species, *A. watanabei* Ito and Imura (2005), has been described from north-eastern Myanmar (Burma), the first record for this genus outside of China. Nearly half (13) of these 27 known *Aristochroa* species were discovered in just the past decade, as more remote montane areas of China and Myanmar have been opened to both tourism and biotic inventory work; and additional new species can be anticipated as previously unstudied areas in this region are sampled.

Since July, 2000, when we collected the first specimens of *Aristochroa abrupta* Kavanaugh and Liang (Kavanaugh and Liang 2003), our continued fieldwork toward an inventory of the carabid beetle species of the Gaoligong Mountains (Gaoligongshan) has produced an additional 80 *Aristochroa* specimens from that area. Our attempts to identify these new specimens included (1) using the available keys to species (Xie and Yu 1993; and Liang and Yu 2002); (2) comparing features of our new specimens with those of identified material available at the Institute of Zoology (Beijing); and, (3) comparing character state information provided in the original and subsequent descriptions of all species not included in the keys or represented by available, identified material with the features of the new specimens in hand. Our morphological and distributional comparisons of these specimens with representatives and/or descriptions of all known species have convinced us that they represent three additional species unknown to science. The purpose of this paper is to

describe these new species and to identify those features which distinguish their adults from each other and from all other known species. Because additional species are very likely to be discovered soon in other parts of China, and perhaps also in other, adjacent countries, we refrain from providing here yet another key that is likely to become obsolete very soon.

MATERIALS AND METHODS

This study is based on the examination of 102 specimens of *Aristochroa* species collected during our fieldwork in the Gaoligongshan in 2000 through 2005 and additional material representing other congeneric species deposited in the collection of the Institute of Zoology in Beijing. Codens for collections cited in this paper are as follows:

CAS	California Academy of Sciences, San Francisco, California 94103, U.S.A.
IOZ	Institute of Zoology, Chinese Academy of Sciences, Beijing 100080, China
KIZ	Kunming Institute of Zoology, Kunming, Yunnan Province, China

We also have relied heavily on species descriptions and illustrations presented in the papers listed in our References section for comparisons of the characteristics of our three new species with those of all previously described species. This is due in part to the fact that we have been unable to study the type specimens of many of the recently described species, and in part because the descriptions and their accompanying illustrations are of sufficient quality and detail to permit meaningful comparisons. As part of the descriptive format for each of the new species described in this paper, we present a section entitled "Comparisons with other species". In these sections, we first distinguish adults of our new species from those of the 14 species included in the Liang and Yu's (2002) key to species by citing the final couplet to which specimens of the new species run in that key. We then cite features that distinguish members of our new species from the other species that run to that same couplet. Species represented in the key include: *Aristochroa balangensis* Xie and Yu (1993), *A. casta* Tschitschérine (1898), *A. deqinensis* Xie and Yu (1993), *A. denyi* Xie and Yu (1993), *A. freyi* Straneo (1938), *A. gratiosa* Tschitschérine (1898), *A. kaznakovi* Tschitschérine (1903), *A. latecostata* (Fairmaire, 1887), *A. militaris* Sciaky and Wrase (1997), *A. perelegans* Tschitschérine (1898), *A. venusta* Tschitschérine (1898), *A. venustoides* Xie and Yu (1993), *A. wangi* Xie and Yu (1993), and *A. zhongdianensis* Liang and Yu (2002). Finally, we cite features that distinguish our new species from each other and from members of the 13 other species that are not included in Liang and Yu's key, namely: *Aristochroa aba* Tian (2004), *A. abrupta* Kavanaugh and Liang (2003), *A. chuanxiensis* Tian (2004), *A. dimorpha* Zamotajlov and Fedorenko (2000), *A. kangdingensis* Zamotajlov and Fedorenko (2000), *A. lama* Tian (2004), *A. lanpingensis* Tian (2004), *A. longiphallus* Tian (2004), *A. morvani* Tian (2004), *A. mosuo* Tian (2004), *A. panda* Tian (2004), *A. sciakyi* Zamotajlov and Fedorenko (2000), and *A. watanabei* Ito and Imura (2005).

All measurements were made with the aid of an ocular micrometer in a Leitz stereoscopic dissecting microscope. Total body length = the linear distance along the midline from the apex of longer mandible to the apex of longer elytron. Pronotal length (PL) = the linear distance along the midline from the anterior margin to the posterior margin; and pronotal width (PW) = the linear distance across the widest part of the pronotum measured at 90° to the longitudinal axis. Elytral length (EL) = the linear distance along the midline from the apex of the scutellum to the apex of the longer elytron; and elytra width (EW) = the linear distance at the widest point across both elytra measured at 90° to the longitudinal axis. Ratios cited in descriptions (i.e., EL/PL, PW/PL, and EL/EW) are based on these measurements. Because the specific details of how measurements (e.g., total body length) were made is typically not included in the descriptions cited in the literature, we include

measurements and ratios here for descriptive purposes only, not for comparative purposes except among those species which we are describing.

Typically, one of the most attractive features of adults of *Aristochroa* species is their metallic reflection or "color" and, in most species, the appearance of contrasting colors on alternating intervals of the elytra. Virtually all previous descriptions of these species have included characters of dorsal coloration and we have used such characters in our descriptions here; but these descriptions of color are very difficult to interpret, especially on the elytra, for several reasons. First, factors that affect the color perceived include the depth of impression of microsculpture, convexity of the surface, especially of the elytral intervals, the angle at which one views the surface, and the angle at which the surface is illuminated for viewing. For example, the degree to which the color of elytral intervals 1, 3, 5, and 7 contrasts with that of intervals 2, 4, 6, and 8 changes in some species as one rotates a specimen from side to side while viewing it illuminated under a microscope. Second, maturity of a specimen (i.e., whether it is fully pigmented and sclerotized or slightly teneral) may influence both the intensity and hue of the metallic color perceived. Finally, based on the examination of longer series, we find that there is typically more individual variation in the metallic "color" of head, pronotum, and elytra within *Aristochroa* species than has been recorded in most descriptions. For all these reasons, we have relied as little as possible on the use of color characters in comparisons provided with our species descriptions, using them comparatively only where the differences are consistent and easily observed and mainly for descriptive purposes.

Visualization and study of female genitalic structures were enhanced by staining dissections with Chlorazol Black E. Digital color images of specimens and selected structures and dissections were captured using an Automontage® imaging system from Synchroscopy. Distribution maps were prepared using Arcview® software. Geographical coordinates provided here for localities were recorded with a Garmin 12 global positioning unit, using Datum WSG 84.

DESCRIPTIONS OF NEW SPECIES

Aristochroa yuae Kavanaugh and Liang, sp. nov.

Figures 1, 4B, 5B, 6B, 7B, 8B, 9, 12A and C.

TYPES.—HOLOTYPE: a male, deposited in IOZ, labeled, "CASENT 1017110" / "China, Yunnan Province, Fugong County, Lishadi Township 10.1 to 11.5 km above Shibali on Shibali road, N27.20049°/E098.71354° to N27.20676°/E098.71763°" / "3225–3290 m, 8 May 2004, Stop #DHK-2004-041, D.H. Kavanaugh, C. E. Griswold, Liang H.-B., Li X.-Y., & Zhu B.-X. collectors" / "Holotype *Aristochroa yuae* Kavanaugh & Liang sp. nov. des. by D. H. Kavanaugh 2006" [red-edged label]. A total of 25 PARATYPES (13 males and 12 females) are deposited in CAS, IOZ, and KIZ (see specimen data below, under Geographic distribution).

TYPE LOCALITY.—10 to 11.5 km west of Shibali, 3225–3290 m, Lishadi Township, Fugong County, Yunnan Province, China.

DIAGNOSIS.—Adults of *A. yuae* are distinguished from all other known species by the following combination of character states: dorsal surface (Fig. 1) with distinct coppery metallic reflection with greenish highlights; eyes large and convex; glossal sclerite with three pairs of apical setae; pronotum (Fig. 4B) moderately wide (ratio PW/PL = 1.27 to 1.41) and moderately narrowed basally, lateral margin shallowly and gradually sinuate in posterior one-fourth, hind angles slightly obtuse, two marginal pronotal setae at/near and anterior to the middle in most individuals (one or three or four seen unilaterally in a few specimens), basal foveae smooth, impunctate; proepisternum smooth, impunctate; elytra with subapical sinuation lateral margin (Fig. 5B) moderately deep, apex of elytral epipleuron roundly and slightly abruptly tapered to merger with elytral lateral margin, ely-

tral microsculpture deeply and approximately equally impressed on all intervals, intervals 1, 3, 5, 7, and 8 moderately and distinctly convex, interval 3 with two setae in most individuals (one or three setae unilaterally in a few specimens); sternum VII of males with two pairs of apical paramedial setae; males with median lobe of aedeagus slightly long and thin, midshaft tubular, without ventral swelling just basal to midshaft bend, preapical shaft slightly bent dorsally basal to apical lamella, apical lamella very long, curved ventrally nearly 90° relative to preapical shaft in lateral aspect (Fig. 6B), narrowly subtriangular, bluntly pointed, and markedly deflected right in ventral aspect (Fig. 6E); females with hemisternites of sternum VIII (Fig. 7B) with deeply incised membranous areas medially, spermathecal gland long and slightly swollen at anterior end (Fig. 8B).

COMPARISONS WITH OTHER SPECIES.—

Using the key of Liang and Yu (2002), specimens of this species run to couplet 13, along with specimens of *A. gratiosa* and *A. militaris*. They can be distinguished from specimens of *A. gratiosa* and/or *A. militaris* by their more distinctly coppery dorsal metallic reflection with greenish highlights (more distinctly greenish with coppery highlights in *A. gratiosa*, dark bronze dorsal metallic reflection in *A. militaris*); pronotum (Fig. 4B) relatively broader (ratio PW/PL = 1.27 to 1.41, compared with

1.20 to 1.25 in *A. gratiosa*), only two marginal pronotal setae at/near and anterior to the middle in most individuals (three to five such setae in *A. gratiosa* and three such setae in *A. militaris*); subapical sinuation of the elytra (Fig. 5B) moderately deep (very shallow in *A. gratiosa*); microsculpture of elytral intervals 1, 3, 5, and 7 deeply impressed (only faintly visible in *A. militaris*); and, in males, sternum VII with two pairs of apical paramedial setae (only one pair of such setae in *A. militaris*), the median lobe of the aedeagus (Fig. 6B and E) slightly longer and thinner (shorter and thicker in *A. gratiosa*) with the midshaft tubular (distinctly broadened toward apex in *A. gratiosa*) and without a ventral swelling just basal to the midshaft bend (present in *A. militaris*), the preapical shaft slightly bent dorsally basal to apical lamella (straight in *A. gratiosa* and *A. militaris*), and the apical lamella very long, curved ventrally nearly 90° relative to preapical shaft in lateral aspect (apical lamella moderate in length and straight relative to preapical shaft in lateral aspect in *A. gratiosa*, slightly curved ventrally in *A. militaris*), and narrowly subtriangular, bluntly pointed apically, and markedly deflected right in ventral aspect (apical lamella broadly subtriangular, apically rounded and nearly symmetrical in ventral aspect in *A. gratiosa*, broadly triangular, broadly pointed apically, and slightly deflected right in *A. militaris*).

Adults of *A. yuae* (Fig. 4B) are easily distinguished from those of *A. abrupta* (Fig. 4A) by their



FIGURE 1. Digital photograph of holotype of *Aristochroa yuae* sp. nov., dorsal aspect; scale line = 1.0 mm.

relatively shorter and broader pronotum, only shallowly and gradually sinuate pronotal lateral margins (deeply and abruptly sinuate in *A. abrupta*), presence of only two marginal pronotal setae at/near and anterior to the middle in most individuals (three to five such setae in *A. abrupta*), and numerous differences in the median lobe of the genitalia of males (compare Figs. 6B and E with Figs. 6A and D). *Aristochroa yuae* adults are distinguished most easily from those of *Aristochroa exochopleurae* sp. nov. by the roundly and slightly abruptly tapered apex of the elytral epipleuron (Fig. 5B) compared with the angulate to denticulate elytral epipleural apex in *A. exochopleurae* (Fig. 5C), as well as by several differences in the median lobe of the genitalia of males (compare Figs. 6B and E with Figs. 6C and F) and the length and shape of the spermathecal gland in females (compare Fig. 8B with Fig. 8C). Based on the limited data available at present for *Aristochroa splendida* sp. nov., it appears that *A. yuae* adults can be distinguished from those of *A. splendida* by their larger and more convex eyes (Fig. 1) (slightly smaller and flatter in *A. splendida*, Fig. 3), pronota (Fig. 4B) relatively longer (ratio PW/PL = 1.27 to 1.41; 1.50 in *A. splendida*) and more narrowed basally (compare with Fig. 4D for *A. splendida*), with lateral margin shallowly and gradually sinuate (bisinuate in *A. splendida*), only two marginal pronotal setae at/near and anterior to the middle in most individuals (three such setae in *A. splendida*), elytral intervals 1, 3, 5, and 7 with deeply impressed microsculpture (microsculpture barely visible on these intervals in *A. splendida*), and in females, with the hemisternites of sternum VIII (Fig. 7B) with deeply incised membranous areas medially (entire, without membranous areas in *A. splendida*, Fig. 7D), and the spermathecal gland (Fig. 8B) long (shorter in *A. splendida*, Fig. 8D).

From adults of the remaining species, those of *A. yuae* can be distinguished as follows: *A. aba*, *A. morvani*, and *A. mosuo* adults have their proepisterna distinctly punctate (impunctate in *A. yuae*); *A. lanpingensis* adults have the lateral pronotal margin deeply and abruptly sinuate anterior to acute hind angle and those of *A. chuanxiensis* lack any trace of sinuation posteriorly on the lateral pronotal margin and the hind angles are distinctly obtuse (lateral pronotal margin shallowly and gradually sinuate and hind angles slight obtuse in *A. yuae*); adults of *A. watanabei* have 2 pairs of apical setae on the glossal sclerite (three such pairs in *A. yuae*); adults of *A. watanabei* and *A. lama* have three and those of *A. panda* have four marginal pronotal setae at/near and anterior to the middle (only two such setae in most *A. yuae*; all of the few individuals seen with more than two setae had these unilaterally only); *A. longiphallus* adults have the dorsal metallic reflection coppery with distinct bluish highlights, pronotum with lateral margin deeply and densely crenulate and hind angles rectangular (coppery dorsal metallic reflection with greenish highlights, pronotum with lateral margin shallowly and sparsely or densely crenulate and hind angles slightly obtuse in *A. yuae*); adults of *A. kangdingensis* have the microsculpture of elytral intervals 1, 3, 5, and 7 effaced (deeply impressed on these intervals in *A. yuae*); elytral intervals 1, 3, 5, and 7 are only slightly convex and intervals 2, 4, 6, and 8 are flat in adults of *A. dinorpha* and the odd intervals are markedly convex and the even intervals flat or slightly convex in *A. sciakyi* (odd intervals moderately convex and even intervals slightly convex in *A. yuae*). Males of *A. yuae* are easily recognizable among all described species on the basis of the shape of the median lobe of the aedeagus alone (compare Figs. 6B and E with illustrations for *A. abrupta* (Figs. 6A and D), *A. exochopleurae* (Figs. 6C and F) and those for other species described in papers cited in the References section); however, too few descriptions and illustrations of female genitalia have been published to make this claim for females..

DESCRIPTION.— Total length males 11.4 to 14.7 mm, females 12.9 to 14.8 mm; ratio EL/PL in males 2.57 to 2.72 (mean = 2.64), in females EL/PL 2.53 to 2.69 (mean = 2.62). Head, pronotum, and elytra black or piceous, venter black, tibiae black or piceous; dorsal surface with marked coppery metallic reflection (with greenish highlights in most individuals) (Fig. 1); elytral intervals

either all concolorous coppery or intervals 1, 3, 5, and 7 dark coppery or black contrasting with intervals 2, 4, 6 and 8 greenish-coppery or coppery.

HEAD. Eyes convex, large, diameter at least twice length of angulate tempora. Frons densely and very finely punctulate; frontal furrows moderately long and deep, slightly divergent posteriorly and terminated posteriorly as two or more short, sharply-defined parallel furrows separated by convexities, furrows slightly to markedly rugose, impunctate. Vertex smooth or slightly rugose, microsculpture comprised of very shallowly impressed, indistinct transverse meshes. Two pairs of supraorbital setae present. Glossal sclerite with three pairs (six) of apical setae (lateral short seta on one or both sides broken and missing in some specimens).

THORAX. Pronotum (Fig. 4B) slightly short and moderately broad, ratio PW/PL = 1.27 to 1.41 (mean = 1.34), greatest width distinctly anterior to middle; lateral margin smoothly arcuate from apical angles to one-fourth from base, then slightly and gradually sinuate to hind angles, with shallow and sparse to dense crenulations present along entire margin; hind angles slightly obtuse; lateral margin with two setae near and/or anterior to middle in most individuals (with only one or with three or four setae in a few individuals); pronotal disc with few to many finely etched transverse wrinkles, otherwise smooth or with sparse and indistinct punctulae only, microsculpture comprised of shallowly impressed, distinctly transverse meshes; basal foveae moderately deep, with two longitudinal sulci present; area between sulci flat or slightly convex, smooth, impunctate, broad anteriorly, distinctly narrowed posteriorly by convergence of sulci; inner sulcus about 1.5 to 2.0 times as long as outer sulcus, slightly to distinctly deflected laterally near base, smooth and impunctate; outer sulcus slightly curved (anterior and posterior ends slightly deflected medially), slightly sigmoid (anterior end of sulcus slightly deflected laterally and posterior end slightly deflected medially), or straight or nearly so, smooth and impunctate; laterobasal ridge (external to outer sulcus) narrow to moderate in width. Prosternum with median longitudinal impression present, faint, transverse groove anterior to coxae absent or present as vague, disrupted depression. Proepisternum, mesepisternum, and metepisternum impunctate. Elytra more or less symmetrically subovoid or subovoid and distinctly narrowed basally, relatively shorter and wider in females than males, ratio EL/EW in males = 1.44 to 1.58 (mean = 1.51), in females 1.39 to 1.48 (mean = 1.44), widest slightly (in males) or distinctly (in females) posterior to middle; subapical sinuation deep; elytral epipleuron roundly but slightly abruptly tapered posteriorly to merger with lateral elytral margin (Fig. 5B); elytral microsculpture comprised of isodiametric meshes, deeply and more or less equally impressed on all intervals; basal margination slightly concave anteriorly, slightly wavy, basal and lateral marginations joined at distinct obtuse angle at humerus; humeral tuberosity absent; striae deeply impressed, very slightly punctate; elytral intervals 1, 3, 5, 7, and 8 moderately convex, intervals 2, 4, and 6 only slightly convex; intervals 4 and 6 entire, without catenations; intervals 1, 3, 5, and 7 distinctly broader than intervals 2, 4, 6, and 8, width of interval 3 at middle 1.5 to 2.3 (mean = 1.9) times width of interval 4; interval 3 with two setae, one each in basal and apical one-thirds (only one or three setae present unilaterally in a very few individuals); interval 5 merged with interval 7 at or near level of subapical sinuation; intervals 4, 5, and 6 not fused posteriorly.

ABDOMEN. Sternum VII with two pairs of apical paramedial setae in both males and females (only one seta seen unilaterally in very few male specimens). Aedeagus of male genitalia with median lobe (Fig. 6B and E) long and moderately broad; in lateral aspect (Fig. 6B), bend of shaft subangulate and distinctly less than 90°, ventral sub-basal swelling present and slightly developed, ventral basomedial and subapical swellings absent, midshaft more or less tubular, consistent in diameter; preapical shaft slightly bent dorsally before apical lamella, with shorter, more abrupt taper toward apex; preapical shaft abruptly widened and markedly bulged left subapically in ventral aspect (Fig. 6E); apical lamella very long, curved ventrally nearly 90° relative to preapical shaft (in

lateral aspect, Fig. 6B), narrowly subtriangular, apically pointed, and markedly deflected right in ventral aspect (Fig. 6E); thorn-shaped sclerite of internal sac (see Ito and Imura, 2005) not visible in cleared specimens, apparently absent). Female genitalia with hemisternites of sternum VIII with deeply incised membranous area medially (Fig. 7B); gonostylus (stylomere II) of ovipositor broad, arcuate; spermatheca pointed and slightly coiled on anterior end; spermathecal gland long, at least 1.5 times as long as spermatheca, tubular and distinctly swollen at anterior end (Fig. 8B).

SEXUAL DIMORPHISM.— The elytra are relatively wider in females than in males (means values for the ratio EL/EW = 1.44 in females and 1.51 in males) and the greatest elytral width is more distinctly posterior to middle in females than in males.

GEOGRAPHICAL DISTRIBUTION.— Fig. 12A and C. At present known only from eastern slope of the Gaoligongshan in the drainage system of the north fork of Yamu He (Yamu River) in Lishadi Township, Fugong County, Yunnan Province, China. We have examined a total of 24 specimens (including the holotype and 23 paratypes) from the following localities: “12 km above Shibali on Shibali Road, N27.19980°/E098.71375°” / “3200 m, 5 May 2004, Stop #LHB-2004-022, Liang H.-B., Li X.-Y., & Xie M. collectors” (2 males); “11.5 km above Shibali on Shibali Road, N27.20676°/E098.71763°” / “3290 m, 6 May 2004, Stop #DHK-2004-036, D.H. Kavanaugh, C. E. Griswold, Liang H.-B., & Zhu B.-X. collectors” (1 female); “10.1 km above Shibali on Shibali Road, N27.20049°, E98.71354°” / “3225 m, 6 May 2004, Stop #DHK-2004-037, D.H. Kavanaugh, C. E. Griswold, Liang H.-B., & Zhu B.-X. collectors” (3 males and 1 female); “11.5 km above Shibali on Shibali Road, N27.20676°/E098.71763°” / “3290 m, 8 May 2004, Stop #DHK-2004-040, D.H. Kavanaugh, C. E. Griswold, Liang H.-B., Li X.-Y., & Zhu B.-X. collectors” (1 male and 1 female); “10.1 to 11.5 km above Shibali on Shibali Road, N27.20049°/E098.71354° to N27.20676°/E098.71763°” / “3225–3290 m, 8 May 2004, Stop #DHK-2004-041, D.H. Kavanaugh, C. E. Griswold, Liang H.-B., Li X.-Y., & Zhu B.-X. collectors” (2 male and 3 females); “8.5 km above Shibali on Shibali Road, north fork of Yamu He, N27.18416°/E098.72026°” / “3100 m, 9 May 2004, Stop #DHK-2004-042, D.H. Kavanaugh & Liang H.-B. collectors” (1 male); “10 .0 km W of Shibali on Shibali Road, 3221 m, N27.20055°/E098.71399°,” / “5–16 August 2005, pitfall traps, Stop #DHK-2005-061, D.H. Kavanaugh, P. Paquin, & H.B. Liang collectors” (3 females); “10 .0 km W of Shibali on Shibali Road, 3200 m, N27.19980°/E098.71375°,” / “5–6 August 2005, Stop #DHK-2005-062, D.H. Kavanaugh, P. Paquin, H.B. Liang, & D.Z. Dong collectors” (1 male); “9.5 to 10.0 km W of Shibali on Shibali Road, N27.19438°/E098.71486° to N27.199807°/” / “E098.71375°, 3195–3200 m, 12 August 2005, Stop# DHK-2005-078, D.H. Kavanaugh, H.B. Liang, & D.Z. Dong collectors” (2 males and 1 female); “8.4 to 9.5 km W of Shibali on Shibali Road, N27.18770°/E098.71936° to N27.19438°/” / “E098.71486°, 3160–3195 m, 16 August 2005, Stop# DHK-2005-091, H. B. Liang collector” (1 female); “4.0 km W of Shibali on Shibali Road, 2800 m,” / “N27.17740°/E098.75490°, 16 August 2005, Stop #DHK-2005-091A, D. Z. Dong collector” (1 male); “10 .0 km W of Shibali on Shibali Road, 3200 m,” / “N27.19980°/E098.71375°, 16 August 2005, Stop #LHB-05-056, J. F. Zhang collector” (1 male and 1 female).

GEOGRAPHICAL RELATIONS WITH CONGENERS.— The known geographical range of *A. yuae* is distinctly allopatric with respect to all other known species of *Aristochroa* except *A. splendida* sp. nov. (Fig. 12 C). To date, all records for *A. yuae* are restricted to elevations between 2800 and 3300 meters on the eastern slope of the Gaoligongshan, whereas the single record for *A. splendida* is from 3710 m, on the ridge crest of the range, immediately above the drainage system (Yamu river system) in which *A. yuae* appears to be restricted. Additional sampling is needed to determine if these two species occur together at intermediate elevations here or elsewhere. The nearest known localities for *A. abrupta* and *A. exochopleurae* are about 46 kilometers north and 132 kilometers south, respectively, of the known range of *A. yuae*.

GEOGRAPHICAL VARIATION.— No locality-specific differences have been observed among individuals from the different localities sampled for this species.

HABITAT DISTRIBUTION.— Specimens of *A. yuae* were found mainly along the road cut (Fig. 9A), between 4 and 11 kilometers west of Shibali, over an elevational range from 2800 to 3290

meters. During daytime hours, a few beetles were found under large (30 to 60 cm in diameter) stones at the base of the road cut (uphill side of the road). Many more were found at night, with the aid of headlamps, while they were actively walking on the bare soil of the roadcut base or wall or on leaf litter under overhanging vegetation. Vegetation in the area consisted mainly of bamboo and *Rhododendron* thickets, so dense as to form a virtually continuous cover, one to three meters tall, except along the roadcut itself and in adjacent disturbed areas, and a discontinuous overstory of mixed conifer (*Tsuga* sp.) and broadleaf deciduous (*Acer*, *Litsea*, and *Sorbus* spp.) trees. Beetles were also collected in pitfall traps on a gentle, southeast-facing slope (Fig. 9B), 10 to 50 meters north of and above the roadcut in an area of *Rhododendron* and bamboo thickets and sparsely scattered *Tsuga* sp.

ETYMOLOGY.— This species epithet, a feminine genitive singular noun in apposition, is the Latinized surname of Professor Peiyu Yu of the Institute of Zoology, Chinese Academy of Sciences, Beijing, selected in recognition of her extensive experience with the genus *Aristochroa* and her continued helpful advice over the course of our projects in the Gaoligongshan and elsewhere in China.

***Aristochroa exochopleurae* Kavanaugh and Liang, sp. nov.**

Figures 2, 4C, 5C, 6C, 7C, 8C, 10, 12A and D.

TYPES.— **HOLOTYPE:** a male, deposited in IOZ, labeled, "CASENT 1017597" / "China, Yunnan, Lushui County, Luzhang Township, Pianma Road at Fengxue Yakou, N25.972283°/E098.68336°", 3150 m, 11 May 2005." / " Stop# 2005-007, D.H. Kavanaugh, H.B. Liang, C.E. Griswold, D.Z. Dong & K.J. Guo collectors" / "Holotype *Aristochroa exochopleurae* Kavanaugh & Liang sp. nov. des. by D. H. Kavanaugh 2006" [red-edged label]. A total of 54 **PARATYPES** (36 males and 18 females) are deposited in CAS, IOZ, and KIZ (see specimen data below, under Geographic distribution).

TYPE LOCALITY.— Pianma Road at Fengxue Yakou (pass), 3150 m, Luzhang Township, Lushui County, Yunnan Province, China.

DIAGNOSIS.— Adults of both sexes of *A. exochopleurae* are distinguished from those of all other known species by the markedly projecting angulate to denticulate apices of their elytral epipleura (Fig. 5C).

COMPARISONS WITH OTHER SPECIES.— Using the key of Liang and Yu (2002), specimens of this species run to couplet 13, with specimens of *A. gratiosa* Tschitschérine and *A. militaris* Sciaky and Wrase. However, they are easily distinguished from members of these two species, as well as from those of all other known species, by the markedly projecting angulate to denticulate apices of their elytral epipleura (Fig. 5C). Males of *A. exochopleurae* also are easily recognizable among all described species on the basis of the shape of the median lobe of the aedeagus (compare Figs. 6C and F with illustrations for *A. abrupta* (Figs. 6A and D), *A. yuae* (Figs. 6B and E) and those for other species described in papers cited in the References section): however, too few descriptions and illustrations of female genitalia have been published to make this claim for females. Additional features that distinguish adults of *A. exochopleurae* from those of other species in which males have somewhat similar genitalia (namely, *A. yuae*, *A. abrupta*, *A. watanabei*, *A. mosuo*, and *A. lanpingensis*) include the following: pronotum with shallowly and gradually sinuate lateral margins anterior to rectangular or slightly obtuse hind angles (deeply and abruptly sinuate lateral margins anterior to distinctly acute hind angles in *A. lanpingensis* adults and to rectangular hind angles in *A. abrupta* adults); thoracic episterna smooth (episterna distinctly punctate in *A. mosuo* adults); and sternum VIII of males with a single pair of apical paramedial setae (two pairs of such setae in *A. yuae* and *A. watanabei* males).

DESCRIPTION.— Total length males 12.9 to 15.6 mm, females 13.9 to 15.3 mm; ratio EL/PL in males 2.48 to 2.73 (mean = 2.59), in females EL/PL 2.47 to 2.72 (mean = 2.59). Head, pronotum,

and elytra black or piceous, venter black, tibiae black or piceous; dorsal surface with marked greenish metallic reflection, with greenish highlights in most individuals (in some individuals, predominant color coppery with greenish highlights) (Fig. 2); elytral intervals either all concolorous coppery or intervals 1, 3, 5, and 7 dark coppery or black contrasting with intervals 2, 4, 6 and 8 greenish-coppery or coppery.

HEAD. Eyes convex, large, diameter at least twice length of angulate tempora. Frons densely and very finely punctulate; frontal furrows long and very deep, slightly divergent posteriorly and terminated posteriorly as two or more short, sharply-defined parallel furrows separated by convexities, furrows slightly to markedly rugose, impunctate. Vertex smooth or slightly rugose, microsculpture comprised of very shallowly impressed, indistinct transverse meshes. Two pairs of supraorbital setae present. Glossal sclerite with two or three pairs of apical setae in approximately equal numbers of individuals (five setae also seen in some specimens).

THORAX. Pronotum (Fig. 4C) slightly longer, ratio $PW/PL = 1.18$ to 1.37 (mean = 1.27), greatest width distinctly anterior to middle; lateral margin smoothly arcuate from apical angles to one-fourth from base, then straight or very slightly and gradually sinuate to hind angles, with deep and dense crenulations present along entire margin; hind angles slightly obtuse or rectangular; lateral margin with two setae near and/or anterior to middle in most individuals (with only one or with three setae in a few individuals); pronotal disc with few to many deeply etched transverse wrinkles, otherwise smooth or with sparse and indistinct punctulae only, microsculpture comprised of very shallowly impressed, distinctly transverse meshes barely visible in some areas; basal foveae very deep, with two longitudinal sulci present; area between sulci flat or slightly convex, smooth, impunctate, or finely and sparsely rugose, broad anteriorly, eliminated or nearly so posteriorly by convergence of sulci; inner sulcus about 1.5 to 2.0 times as long as outer sulcus, markedly deflected laterally near base, confluent with outer sulcus or nearly so near base, smooth and impunctate; outer sulcus slightly sigmoid (anterior end of sulcus slightly deflected laterally and posterior end slightly deflected medially) or straight or nearly so, smooth and impunctate; laterobasal ridge (external to outer sulcus) broad. Prosternum with median longitudinal impression absent or present and vague or distinct, transverse groove anterior to coxae absent or present as vague, disrupted depression. Proepisternum, mesepisternum, and metepisternum impunctate. Elytra more or less symmetrically subovoid or subovoid and distinctly narrowed basally, slightly shorter and wider in females than males, ratio EL/EW in males = 1.44 to 1.60 (mean =



FIGURE 2. Digital photograph of holotype of *Aristochroa exochopleurae* sp. nov., dorsal aspect; scale line = 1.0 mm.

1.52), in females 1.34 to 1.50 (mean = 1.45), widest at middle (in males) or slightly posterior to middle (in females); subapical sinuation deep; elytral epipleuron angulate or denticulate, abruptly truncate just anterior to merger with lateral elytral margin (Fig. 5C); elytral microsculpture comprised of isodiametric meshes, shallowly and more or less equally impressed on all intervals; basal margination slightly concave anteriorly, slightly wavy, basal and lateral marginations joined at distinct obtuse angle at humerus; humeral tuberosity absent; striae moderately impressed, very slightly punctate; elytral intervals 1, 3, 5, 7, and 8 moderately convex, intervals 2, 4, and 6 only slightly convex; intervals 4 and 6 entire, without catenations; intervals 1, 3, 5, and 7 distinctly broader than intervals 2, 4, 6, and 8., width of interval 3 at middle 2.0 to 2.5 (mean = 2.2) times width of interval 4; interval 3 with two setae, one each in basal and apical one-thirds (only one or three setae present unilaterally in a very few individuals); interval 5 merged with interval 7 at or near level of subapical sinuation; intervals 4, 5, and 6 not fused posteriorly.

ABDOMEN. Sternum VII with one pair of apical paramedial setae in males and two pairs in females (only one seta seen unilaterally in very few female specimens). Aedeagus of male genitalia with median lobe (Fig. 6C and F) moderate in length and width; in lateral aspect (Fig. 6C), bend of shaft evenly arcuate and less than 90°, ventral sub-basal swelling present and slightly developed, ventral basomedial and subapical swellings absent, midshaft more or less tubular, consistent in diameter, preapical shaft slightly bent dorsally before apical lamella, long, gradually tapered toward apex; preapical shaft not widened but slightly bulged right and left subapically in ventral aspect (Fig. 6F); apical lamella long, distinctly curved ventrally relative to preapical shaft (in lateral aspect, Fig. 6C), narrowly subtriangular, apically pointed, and slightly deflected right in ventral aspect (Fig. 6F); thorn-shaped sclerite of internal sac (see Ito and Imura, 2005) not visible in cleared specimens, apparently absent). Female genitalia with hemisternites of sternum VIII with deeply incised membranous area medially (Fig. 7C); gonostylus (stylocere II) of ovipositor broad, arcuate; spermatheca pointed and slightly coiled on anterior end; spermathecal gland long, at least 1.5 times as long as spermatheca, tubular, slightly swollen near anterior end and slightly narrowed at end (Fig. 8C).

SEXUAL DIMORPHISM.— The elytra are relatively wider in females than in males (means values for the ratio EL/EW = 1.44 in females and 1.52 in males) and the greatest elytral width is slightly posterior to middle in females and at middle in males. Males have a single pair of apical paramedial setae on sternum VII while females have two pairs of such setae.

GEOGRAPHICAL DISTRIBUTION.— Fig. 12A and D. At present, known only from the crest of the Gaoligongshan at Fengxue Yakou (Pass) and within 0.5 km east and 0.6 west of that pass in Luzhang and Pianma Townships (respectively), Lushui County, Yunnan Province, China.). We have examined a total of 55 specimens (including the holotype and 54 paratypes) from the following localities: **Luzhang Township:** "Pianma Road at Fengxue Yakou, N25.972283°/E098.68336°", 3150 m, 11 May 2005," / " Stop# 2005-007, D.H. Kavanaugh, H.B. Liang, C.E. Griswold, D.Z. Dong & K.J. Guo collectors" (1 male); "100 m S of Fengxue Yakou on E slope, N25.97195°/E098.68381°," / "3150 m, 11–21 May 2005, Stop# 2005-008, pitfall trap, D.H. Kavanaugh, C.E. Griswold, & K.J. Guo collectors: (3 males and 2 females); "Fengxue Yakou to 0.5 km E on Pianma Road, 3130–3150 m, N25.97288°/E098.68336° to" / "N25.97347°/E098.68780°, 17 May 2005, Stop# 2005-013B, D.H. Kavanaugh, C.E. Griswold, H.B. Liang, D.Z. Dong, & K.J. Guo collectors" (26 males and 16 females). **Pianma Township:** "Fengxue Yakou to 0.6 km W on Pianma Road, 3120–3150 m, N25.97288°/E098.68336° to" / "N25.97410°/E098.67716°, 18 May 2005, Stop# 2005-014, D.H. Kavanaugh, C.E. Griswold, H.B. Liang, D.Z. Dong, & K.J. Guo collectors" (1 male); "Fengxue Yakou to 0.5 km W on Pianma Road, 3120–3150 m, N25.97288°/E098.68336° to" / "N25.97410°/E098.67716°, 19 May 2005, Stop# 2005-016, D.H. Kavanaugh, C.E. Griswold, H.B. Liang, D.Z. Dong, & K.J. Guo collectors" (6 males).

GEOGRAPHICAL RELATIONS WITH CONGENERS.— The known geographical range of *A. exo-*

chopleurae is distinctly allopatric with respect to all other known species of *Aristochroa* (Fig. 12 D). The nearest known locality for *A. abrupta* is about 183 kilometers north of the range of *A. exochopleurae*; and the nearest known localities for *A. yuae* and *A. splendida* are both about 132 kilometers north.

GEOGRAPHICAL VARIATION.— Unknown; known at present from a single area.

HABITAT DISTRIBUTION.— Most specimens of *A. exochopleurae* were found along the road cut (Fig. 10B), both at the pass and across the steep slopes immediately east and west of it, at 3120 to 3150 meters elevation. During daytime hours, a few beetles were found under large (30 to 60 cm in diameter) stones at the base of the road cut (uphill side of the road). Many more were found at night, with the aid of headlamps, while they were actively walking on the bare soil of the roadcut base or wall or on leaf litter under overhanging vegetation. Vegetation in the area consisted mainly of bamboo and *Rhododendron* thickets, so dense as to form a virtually continuous cover, one to three meters tall, except along the roadcut itself and in rockslide areas. Beetles were also collected in pitfall traps on a steep, east-facing slope (Fig. 10A), about 100 meters south of the pass on its eastern flank, in an area of taller (up to 5 meters high) *Rhododendron* and bamboo thicket.

ETYMOLOGY.— This species epithet, a feminine genitive plural noun in apposition, is a compound word derived from the Greek *exochos*, an adjective meaning jutting out, projecting, or prominent, and *pleura*, the Greek word for side, here referring specifically to the prominently projecting apices of the elytral epipleura seen in adult males and, to a slightly lesser extent, females of this species.

***Aristochroa splendida* Kavanaugh and Liang, sp. nov.**

Figures 3, 4D, 5D, 6D, 7D, 8D, 11, 12A and C.

TYPES.— **HOLOTYPE:** a female, deposited in IOZ, labeled, “CASENT 1017808” / “China, Yunnan, Fugong County, Lumadeng Township, second cirque S of Shibali Yakou at border post “31”, N27.20333°/E098.69303°” / “3710 m, 17 August 2005, Stop# DHK-2005-095, H.B. Liang, D.Z. Dong, & J.F. Zhang collectors” / “Holotype *Aristochroa splendida* Kavanaugh & Liang sp. nov. des. by D. H. Kavanaugh 2006” [red-edged label].

TYPE LOCALITY.— Second cirque south of Shibali Yakou, 3710 m, Lumadeng Township, Fugong County, Yunnan Province, China.

DIAGNOSIS.— Females of *A. splendida* are distinguished from those of all other known species by the following combination of character states: head, pronotum, and elytra with brilliant green metallic reflection dorsally (Fig. 3), elytral intervals 1, 3, 5, and 7 distinctly convex with contrasting brilliant coppery metallic reflection and with nearly effaced microsculpture, at least at the interval centers; eyes slightly reduced in size and slightly flattened; pronotum (Fig. 4D) relatively shorter and broader (ratio PW/PL = 1.50), lateral margin abruptly bisinuate in basal one-fourth; subapical sinuation of elytral lateral margin (Fig. 5D) very shallow, elytral epipleuron smoothly and narrowly tapered to merger with elytral lateral margin, elytral interval 3 with one seta in apical one-third; females with hemisternites of sternum VIII entire (Fig. 7D), without medial membranous areas, spermathecal gland relatively short and distinctly swollen at anterior end (Fig. 8D).

COMPARISONS WITH OTHER SPECIES.— Using the key of Liang and Yu (2002), the single known specimen of this species runs to couplet 4, but no further because it conforms to neither alternative in that couplet. Among adults of all species included in the key, *A. splendida* adults are apparently unique in having elytral intervals 1, 3, 5, and 7 both distinctly convex and with nearly effaced microsculpture, at least at the centers of those intervals.

Adults of *A. splendida* apparently are easily distinguished from those of *A. abrupta*, *A. yuae*, and *A. exochopleurae* by the brilliant greenish metallic reflection on the head, pronotum, and ely-

tra (coppery metallic reflection with greenish highlights in the other species), slightly smaller and flatter eyes (Fig. 3; eyes larger and more convex in the other species, Figs. 1 and 2), pronotum shorter and broader basally (Fig. 4D; longer and more narrowed basally in the other species, Figs. 4A, B, and C), with lateral margin abruptly bisinuate in basal one-fourth (shallowly and gradually sinuate in *A. yuae* (Fig. 4B), straight or shallowly and gradually sinuate in *A. exochopleurae* (Fig. 4C), and moderately deeply and abruptly sinuate in *A. abrupta* (Fig. 4A)), elytral intervals 1, 3, 5, and 7 with microsculpture nearly effaced at least at interval centers (microsculpture distinctly and shallowly or deeply impressed in the other species), subapical sinuation of the elytral lateral margin very shallow (deep in the other species), and females with hemisternites of sternum VII entire (Fig. 7D), without medial membranous areas (with deeply incised membranous area medially in the other species, Figs. 7A, B, and C), and spermathecal gland relatively short (Fig. 8D; longer in the other species, Figs. 8A, B, and C).

From adults of all the remaining species, those of *A. splendida* can be distinguished by their slightly smaller and flatter eyes (larger and more convex in all other species), and the lateral pronotal margin bisinuate in the basal one-fourth (straight or slightly to deeply sinuate in all other species). They are also distinguished from adults of all other species except *A. morvani* by their short and shallow frontal furrows (longer and deeper in all other species), and from adults of *A. kangdingensis*, the species in which the pattern of elytra microsculpture appears to be most similar, by their black tibiae and catenate elytral intervals 4 and 6 (tibiae brown and intervals 4 and 6 entire, not catenate, in *A. kangdingensis*).

DESCRIPTION.— Total length holotype female 12.9 mm, ratio EL/PL = 2.73. Head, pronotum, elytra, venter, and tibiae black; dorsal surface of head and pronotum with brilliant greenish metallic reflection without coppery highlights; elytral intervals 1, 3, 5, and 7 brilliant coppery, intervals 2, 4, 6 and 8 and all other elytral areas brilliant greenish (Fig. 3).

HEAD. Eyes slightly flattened, slightly reduced in size, diameter less than twice length of angulate tempora. Frons densely and very finely punctulate; frontal furrows short and shallow, slightly divergent posteriorly and terminated posteriorly as a few vaguely-defined wrinkles, smooth, impunctate. Vertex smooth. Two pairs of supraorbital setae present. Glossal sclerite with two pairs of apical setae.

THORAX. Pronotum (Fig. 4D) short and broad, ratio PW/PL = 1.50, greatest width slightly anterior to middle; lateral margin smoothly arcuate from apical angles to one-fourth from base, then slightly and more abruptly bisinuate to bluntly denticulate hind angles, with shallow crenulations



FIGURE 3. Digital photograph of holotype of *Aristochroa splendida* sp. nov., dorsal aspect; scale line = 1.0 mm.

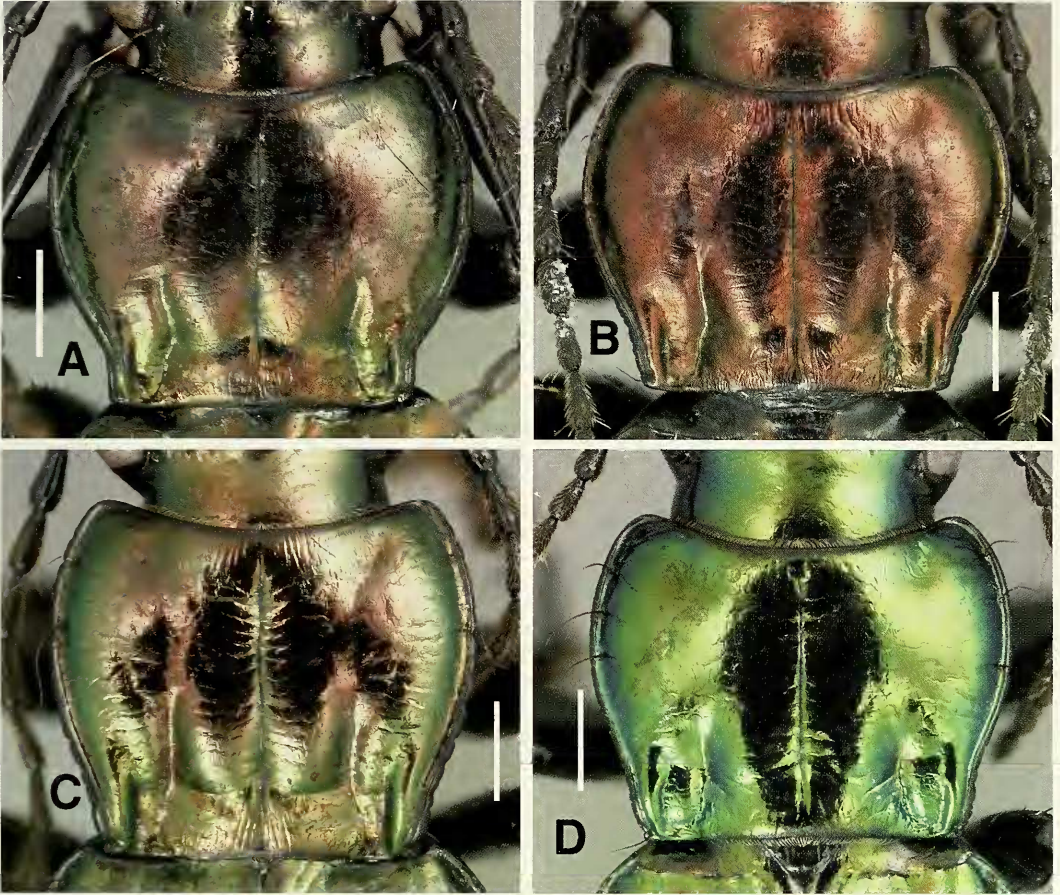


FIGURE 4. Pronotum, dorsal aspect; scale lines = 1.0 mm. A. *Aristochroa abrupta* Kavanaugh and Liang. B. *Aristochroa yuae* sp. nov. C. *Aristochroa exochopleurae* sp. nov. D. *Aristochroa splendida* sp. nov.

present along entire margin, densest near basal angles; hind angles slightly obtuse; lateral margin with three setae at and anterior to middle; pronotal disc with just a few faintly etched transverse wrinkles, otherwise smooth with sparse, minute punctulae over entire surface, microsculpture comprised of very shallowly impressed, distinctly transverse meshes barely visible in some areas; basal foveae moderately deep, with two longitudinal sulci present; area between sulci distinctly convex, smooth, impunctate, broad anteriorly, slightly narrowed posteriorly by convergence of sulci; inner sulcus about 1.5 times as long as outer sulcus, distinctly deflected laterally near base, smooth and impunctate; outer sulcus slightly curved (anterior and posterior ends slightly deflected medially), smooth and impunctate; laterobasal ridge (external to outer sulcus) moderate in width. Prosternum with median longitudinal impression present but faint, transverse groove anterior to coxae present as vague, disrupted depression. Proepisternum, mesepisternum, and metepisternum impunctate. Elytra more or less symmetrically subovoid, ratio $EL/EW = 1.39$, widest at middle; subapical sinuation very shallow; elytral epipleuron gradually and narrowly tapered to merger with lateral elytral margin (Fig. 5D); elytral microsculpture comprised of isodiametric meshes, very faintly impressed on intervals 1, 3, 5, and 7, moderately impressed on intervals 2, 4, 6, and 8; basal margination slightly concave anteriorly, slightly wavy, basal and lateral marginations joined at distinct

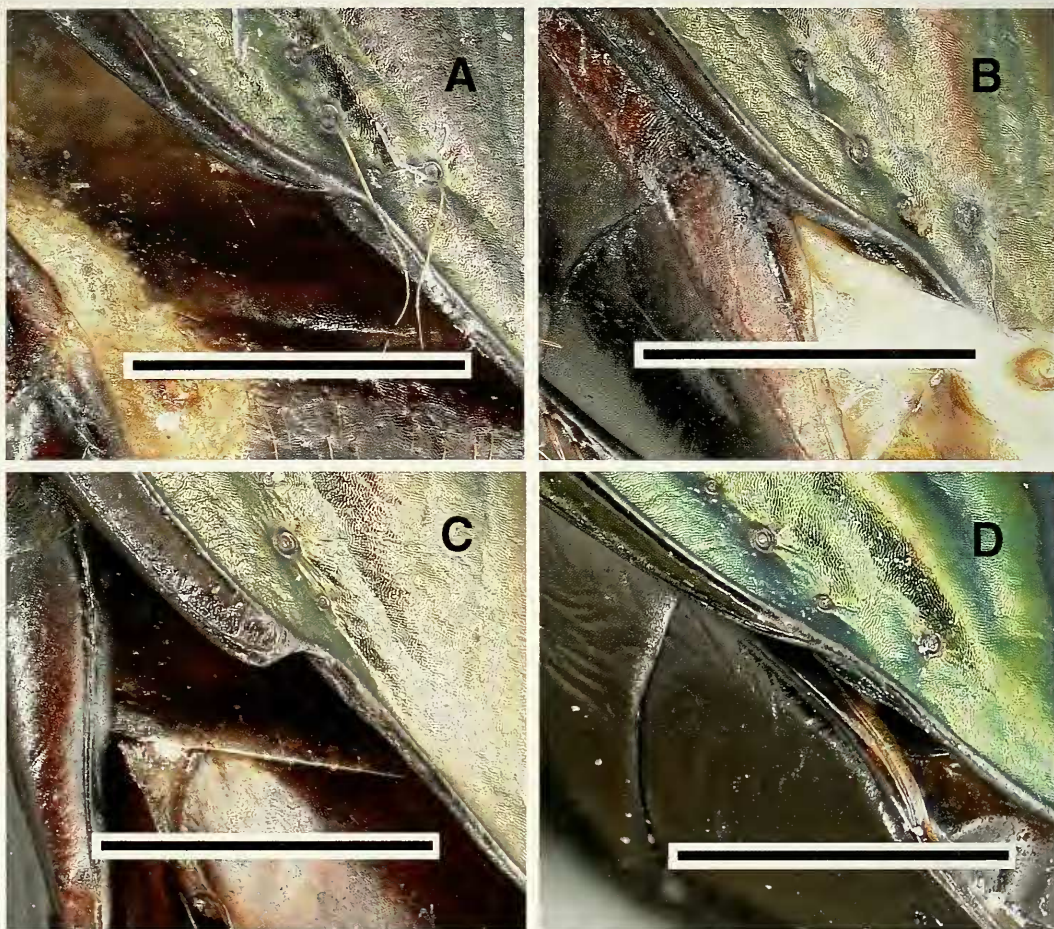


FIGURE 5. Left elytron, showing apical end of elytral epipleuron, internal plica, and subapical sinuation of lateral margin, posterolateral oblique aspect; scale lines = 1.0 mm. A. *Aristochroa abrupta* Kavanaugh and Liang. B. *Aristochroa yuae* sp. nov. C. *Aristochroa exochopleurae* sp. nov. D. *Aristochroa splendida* sp. nov.

obtuse angle at humerus; humeral tuberosity distinctly present; striae moderately impressed, finely and distinctly punctate; elytral intervals 1, 3, 5, 7, and 8 moderately convex, intervals 2, 4, and 6 slightly convex; intervals 4 and 6 catenate, especially subapically; intervals 1, 3, 5, and 7 distinctly broader than intervals 2, 4, 6, and 8, width of interval 3 at middle 1.7 times width of interval 4; interval 3 with one seta present in apical one-third; interval 5 merged with interval 7 at apical one-fourth; intervals 4, 5, and 6 not fused posteriorly.

ABDOMEN. Sternum VII with two pairs of apical paramedial setae (in female). Female genitalia with hemisternites of sternum VIII entire medially (without medial membranous areas) (Fig. 7D); gonostylus (stylomere II) of ovipositor broad, arcuate; spermatheca pointed and slightly coiled on anterior end; spermathecal gland short, only slightly longer than spermatheca, tubular, distinctly swollen at anterior end (Fig. 8D).

SEXUAL DIMORPHISM.— Unknown (holotype female is the only specimen known at this time).

GEOGRAPHICAL DISTRIBUTION.— Fig. 12A and C. At present, known only from crest of the Gaoligongshan, on the China/Myanmar border, at the top of the drainage system of the north fork

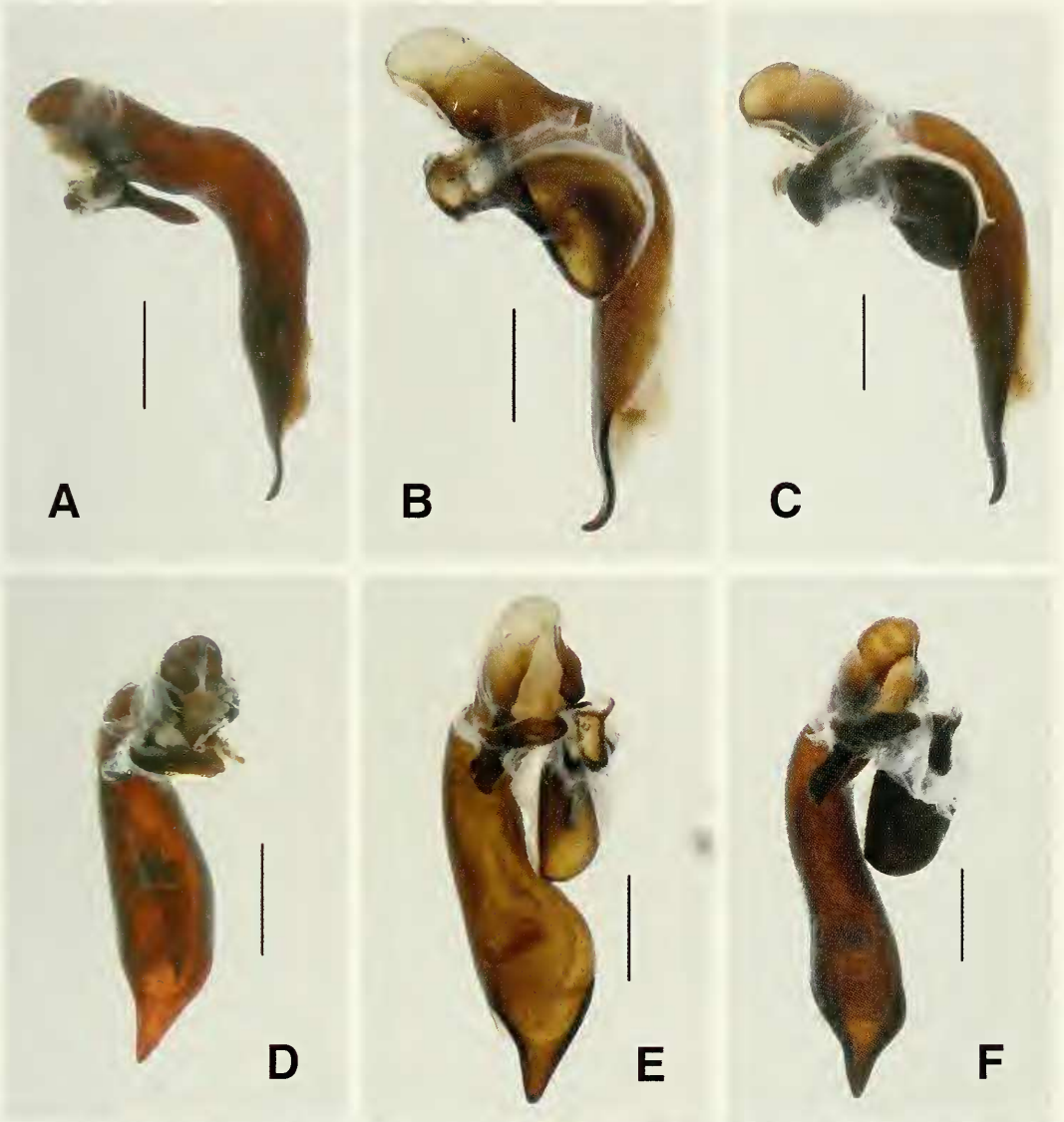


FIGURE 6. Median lobe of aedeagus of male; A-C, left lateral aspect, D-F, ventral aspect; scale lines = 1.0 mm. A and D, *Aristochroa abrupta* Kavanaugh and Liang. B and E, *Aristochroa yuae* sp. nov. C and F, *Aristochroa exochopleurae* sp. nov.

of Yamu He (Yamu River) in Lumadeng Township, Fugong County, Yunnan Province, China (for locality information, see label data for type specimen).

GEOGRAPHICAL RELATIONS WITH CONGENERS.— The known geographical range of *A. splendida* is distinctly allopatric with respect to all other known species of *Aristochroa* except *A. yuae* sp. nov. (Fig. 12 C). The single record for *A. splendida* is from the ridge crest of the Gaoligongshan, at 3710 m, an area immediately above the drainage system (Yamu River system) in which *A. yuae* appears to be restricted, at elevations ranging from 2800 to 3300 meters, on the eastern slope of the range. Additional sampling is needed to determine if these two species occur together at intermediate elevations here or elsewhere. The nearest known localities for *A. abrupta* and *A. exochopleurae*

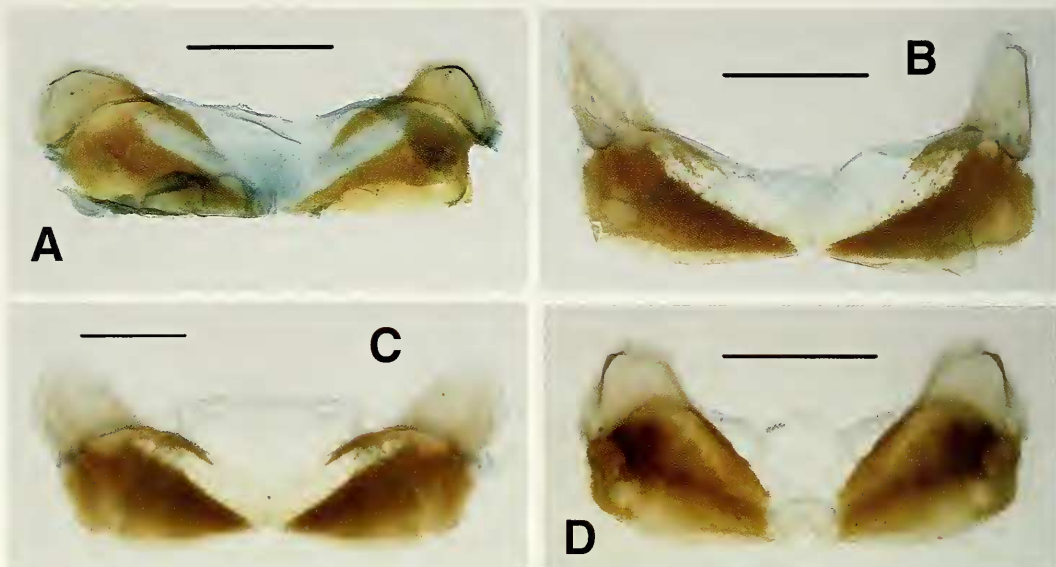


FIGURE 7. Sternum VIII, ventral aspect: scale lines = 1.0 mm. A. *Aristochroa abrupta* Kavanaugh and Liang. B. *Aristochroa yuae* sp. nov. C. *Aristochroa exochopleurae* sp. nov. D. *Aristochroa splendida* sp. nov.

are about 46 kilometers north and 132 kilometers south, respectively, of the known range of *A. splendida*.

GEOGRAPHICAL VARIATION.— Unknown; known at present only from a single specimen from a single locality.

HABITAT DISTRIBUTION.— The type specimen was collected from under a stone on the crest of the Gaoligongshan (Fig. 11), at 3710 meters elevation, along the edge of a trail through a mosaic of low (up to one meter high) thickets of shrubby *Rhododendron* spp. and/or bamboo and patches of moist alpine meadow vegetation.

ETYMOLOGY.— This species epithet is a feminine nominative singular adjective, derived from the Latin *splendidus*, meaning bright or shining, in reference to the brilliant metallic reflection and luster of the dorsal surface of the single known adult of this species.

ACKNOWLEDGEMENTS

We thank Mr. Benxiang Zhu of the Forest Protection Bureau of Fugong County, Ms. Xueyan Li of the Kunming Institute of Zoology, Mr. Jinfeng Zhang, a farmer and businessman in Fugong, and Dr. Charles E. Griswold (CAS) for their assistance in collecting specimens. Work on this project received generous support through grants from the National Science Foundation (Grant No. 0103795) and the National Geographic Society (Grant No. 6403-99) to the California Academy of Sciences, from the Chinese Natural Sciences Foundation (Grant No. 30570213) to the junior author [HBL], and from donors to the China Natural History Project at the California Academy of Sciences. Arcview® software used to create distribution maps was donated by The Environmental Conservation Program, headed by Charles Convis, of the Environmental Systems Research Institute (ESRI). This publication represents Contribution No. 40 of the Center for Biodiversity Research and Information (CBRI) and Contribution No. 28 of the China Natural History Project, both at the California Academy of Sciences.



FIGURE 8. Female genitalia, ventral aspect; co = common oviduct, sp = spermatheca, and spg = spermathecal gland; scale lines = 1.0 mm. A. *Aristochroa abrupta* Kavanaugh and Liang. B. *Aristochroa yuae* sp. nov. C. *Aristochroa exochopleurae* sp. nov. D. *Aristochroa splendida* sp. nov.

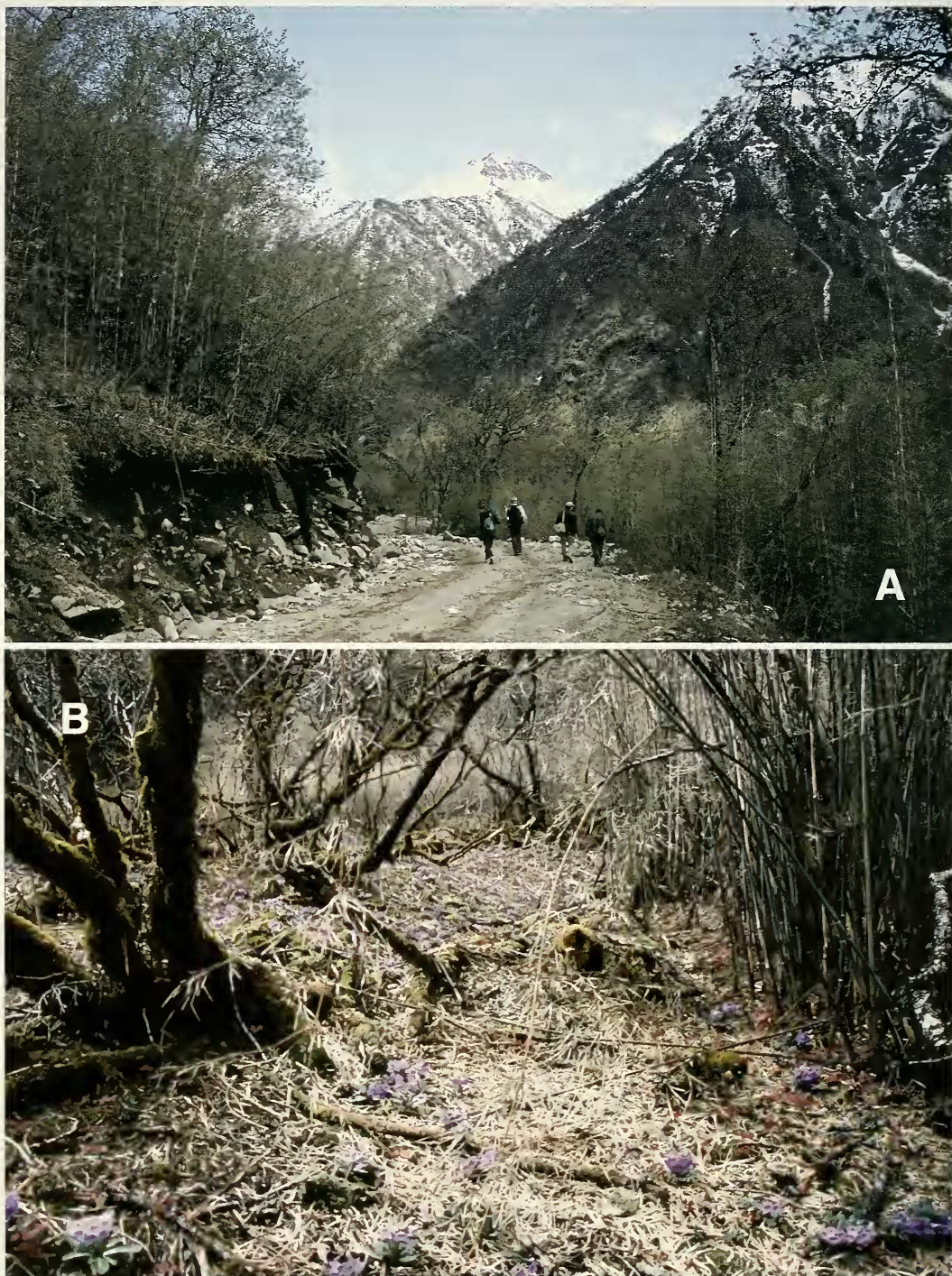


FIGURE 9. Photographs of habitat for *Aristochroa yuae* sp. nov., eastern slope of the Gaoligongshan in Fugong County, Yunnan China, early May, 2004. A. Overview of habitat at 8.5 km west of Shibali, 3100 m, along roadcut through mixed conifer/broadleaf deciduous forest with mixed bamboo/*Rhododendron* thickets. B. Detail of groundcover in mixed bamboo/*Rhododendron* thicket at 10.1 km west of Shibali, 3225 m; numerous *Primula* sp. in bloom.



FIGURE 10. Photographs of habitat for *Aristochroa exochopleurae* sp. nov., eastern slope of the Gaoligongshan, just east of Fengxue Yakou (pass) at 3150 m, in Lushui County, Yunnan China, mid-May, 2005. A. Northeast-facing slope, covered by mixed bamboo/*Rhododendron* thickets with scattered conifers at higher elevations (in distance). B. View of upper slope along roadcut, with thick cover of shrubby *Rhododendron* spp. and bamboo in thickets.

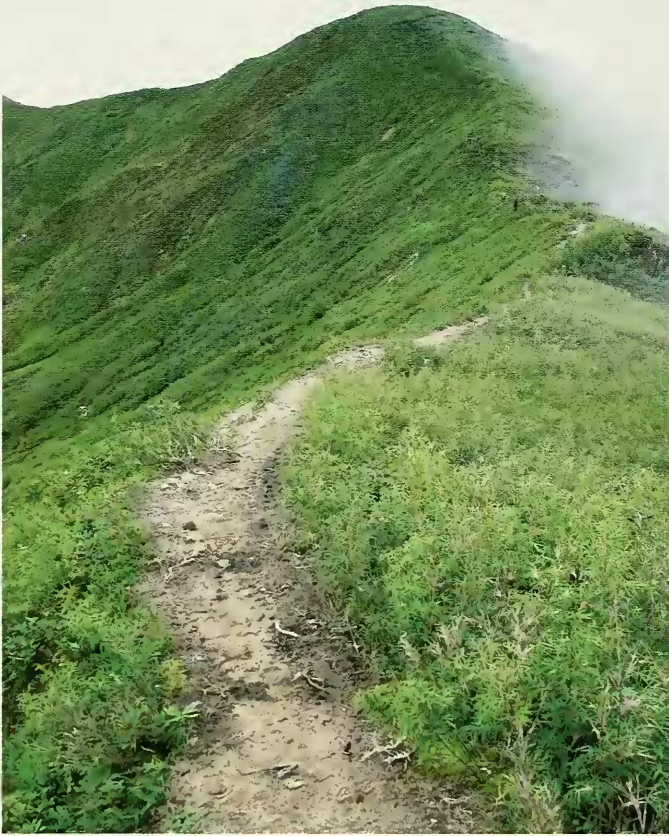


FIGURE 11. Photograph of habitat for *Aristochroa yuae* sp. nov.; view looking south along the crest of the Gaoligongshan, at China/Myanmar border, 3700 m, in Fugong County, Yunnan China, mid-August, 2004; trailside vegetation includes low-growing bamboo and *Rhododendron* spp. thickets and assorted ericaceous and herbaceous plants in patches of moist or dry meadow.

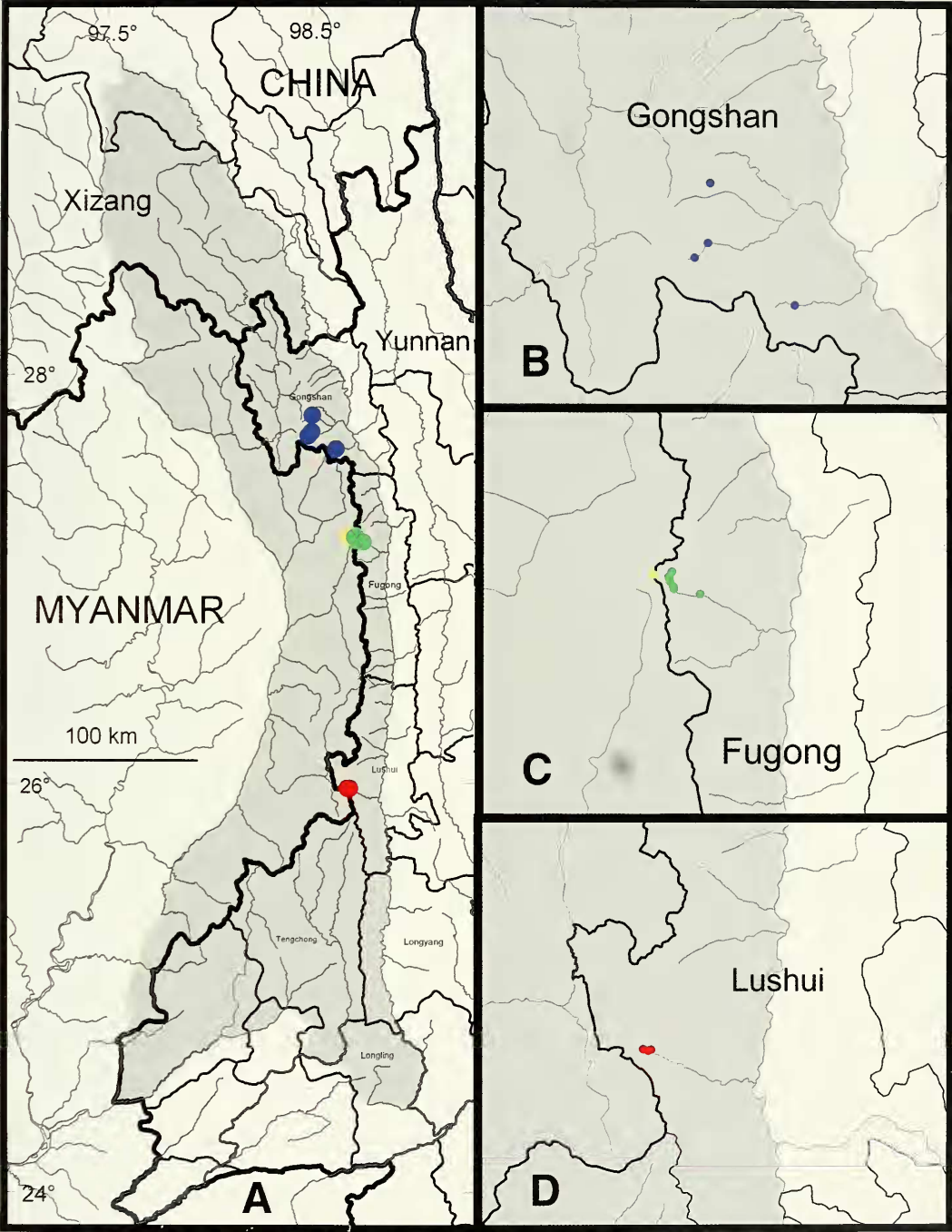


FIGURE 12. Map illustrating distributions of known localities for *Aristochroa* species in the Gaoligongshan, western Yunnan Province, China. A. Map of Gaoligong region illustrating geographical relationships of known distributions of all known species; grey area denotes extent of study area; blue circles = *A. abrupta* Kavanaugh and Liang; green circles = *A. yuae* sp. nov.; yellow circle = *A. splendida* sp. nov.; and red circles = *A. exochopleurae* sp. nov. B-D. Details of distributions of known records for each species plotted separately, color code same as in A.

REFERENCES

- KAVANAUGH D.H. AND H.B. LIANG. 2003. A new species of *Aristochroa* Tschitschérine (Coleoptera: Carabidae) from Yunnan, China. *Proceedings of California Academy of Sciences*, ser. 4, 54(14):239–245.
- LIANG, H.B., AND P.Y. YU. 2002. A new species of *Aristochroa* Tschitschérine (Coleoptera: Carabidae), with a key to species for the genus. *Coleopterists Bulletin* 56:144–151.
- SCIACKY, R., AND D.W. WRASE. 1997. Twenty-nine new taxa of Pterostichinae from Shaanxi (Coleoptera, Carabidae). *Linziger Biologische Beiträge* 29(2):1087–1139.
- STRANEO, S.L. 1938. Nuova specie del genere *Aristochroa* Tschit. *Bollettino della Società Entomologica Italiana* 70:122–123.
- TIAN M.Y. 2004. Descriptions of new species of the genus *Aristochroa* Tschitschérine, 1898, from Yunnan, Sichuan and Qinghai provinces, China. *Coléoptères* 10(20):235–246.
- TSCHITSCHÉRINE, T. 1898. Matériaux pour servir à l'étude des Féroniens, IV. *Horae Societatis Entomologicae Rossicae* 32:70–77.
- TSCHITSCHÉRINE, T. 1903. Species nova generis *Aristochroa* Tsch. (Coleoptera, Carabidae). *Revue Russe de Entomologie* 3–4:224–225.
- XIE, W.P., AND P.Y. YU. 1993. Classification of the genus *Aristochroa* in China (Coleoptera: Carabidae). *Acta Scientiarum Naturalium Universitatis Pekinensis* 29(2):174–183.
- ZAMOTAJLOV, A.S., AND D.N. FEDORENKO. 2000. New species of the genus *Aristochroa* Tschitschérine, 1898 (Coleoptera: Carabidae) from west China. *Russian Entomological Journal* 9:103–112.